



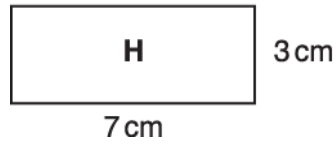
1. A square has an area of  $100 \text{ cm}^2$ .

Find its perimeter.

----- cm [2]

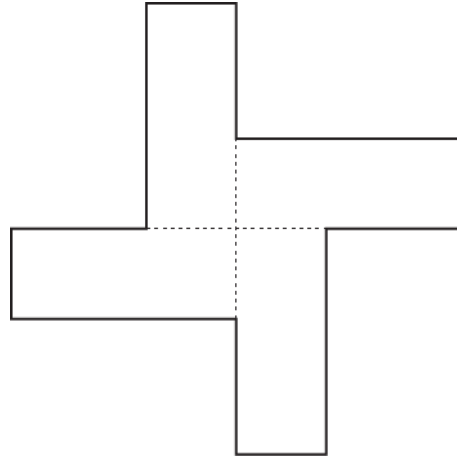


2. Rectangle H has length 7 cm and width 3 cm.



**Not to scale**

This shape is made from four rectangles each of which is identical to H.



**Not to scale**

(i) How many lines of symmetry does this shape have?

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[1]

(ii) What is the order of rotation symmetry of this shape?

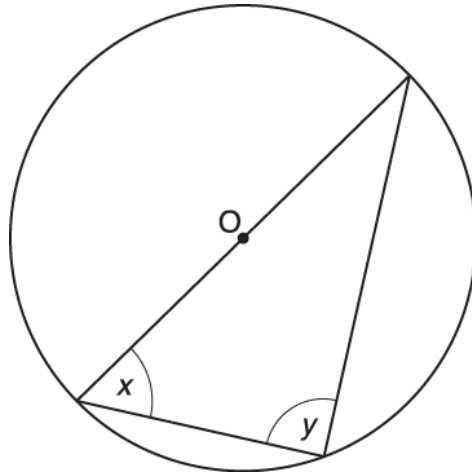
-----  
[1]

(iii) What is the perimeter of this shape?

----- cm  
[3]



3. This is a triangle in a circle with centre O.



Jake says:

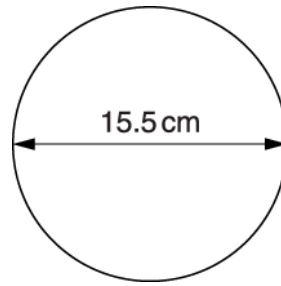
‘The circumference of the circle is bigger than the perimeter of the triangle.’

Without measuring, say if Jake is correct.  
Explain your answer.

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[1]

4. A circular tea plate has a diameter of 15.5 cm.

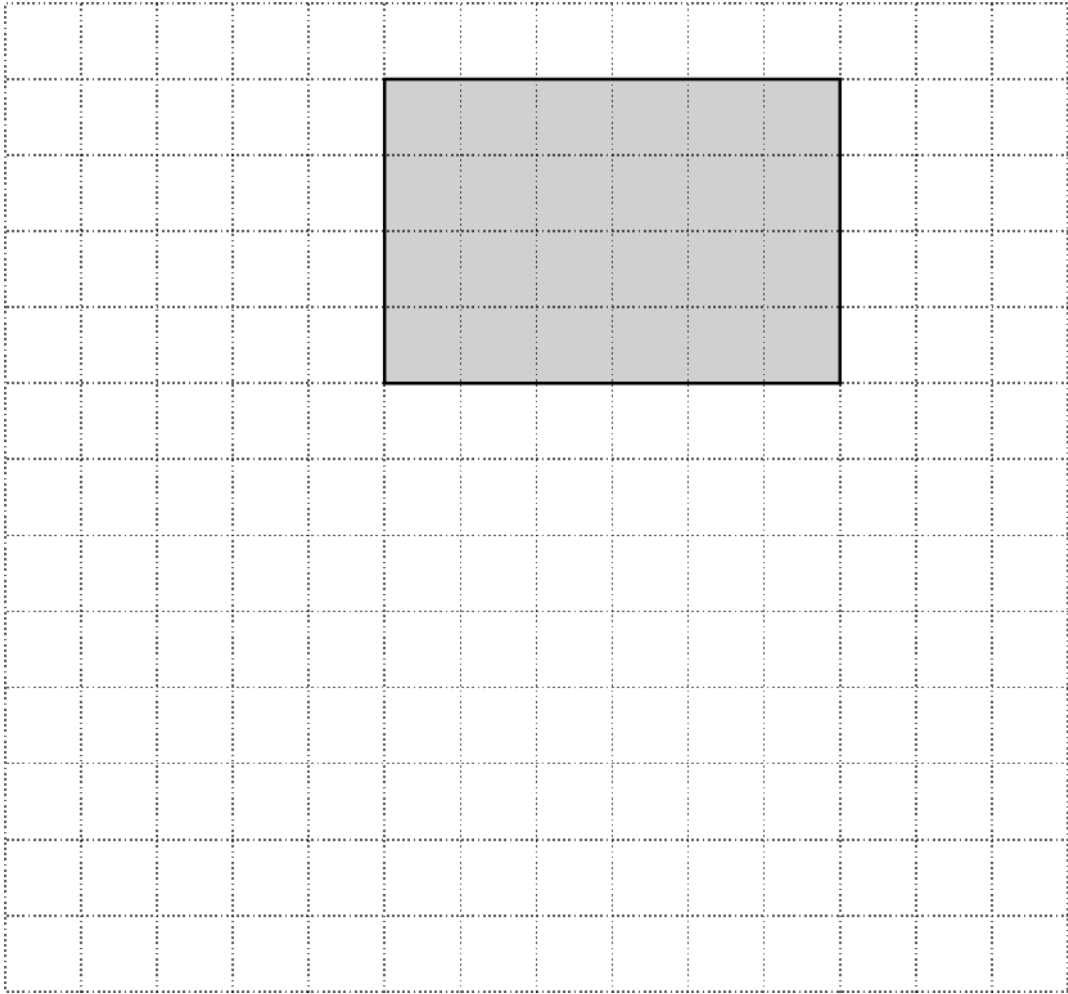


Work out the circumference of this plate.

----- cm [2]



5. A rectangle has been drawn on a one-centimetre square grid.



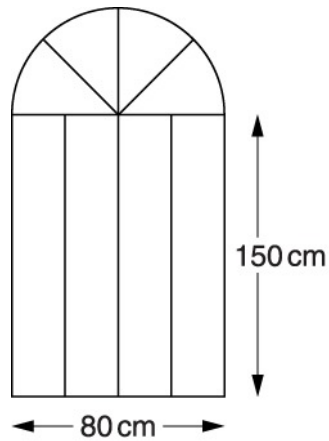
(i) What is the perimeter of the rectangle?

(i) ..... cm [1]

(ii) On the grid draw a different rectangle with the same perimeter.

[2]

6. A gate is made from strips of metal.  
The outline of the gate is a rectangle topped by a semicircle.



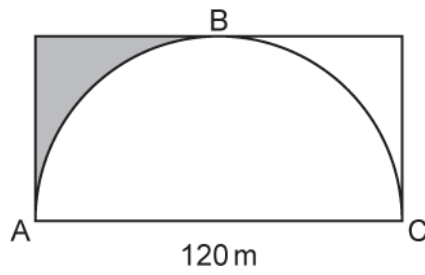
**Not to scale**

- \* Work out the total length of metal strip needed to make the gate.  
Give your answer correct to 3 significant figures.

----- cm [7]

7. The diagram shows a semi-circle inside a rectangle of length 120 m.  
The semi-circle touches the rectangle at A, B and C.

Not to scale



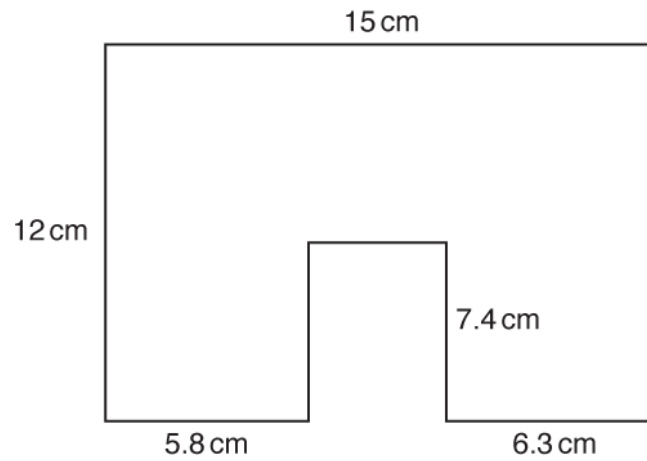
Calculate the **perimeter** of the shaded region.  
Give your answer correct to 3 significant figures.

----- m [5]



8. The shape below is formed from a rectangle measuring 12 cm by 15 cm from which a rectangle of length 7.4 cm has been removed.

**Not to scale**



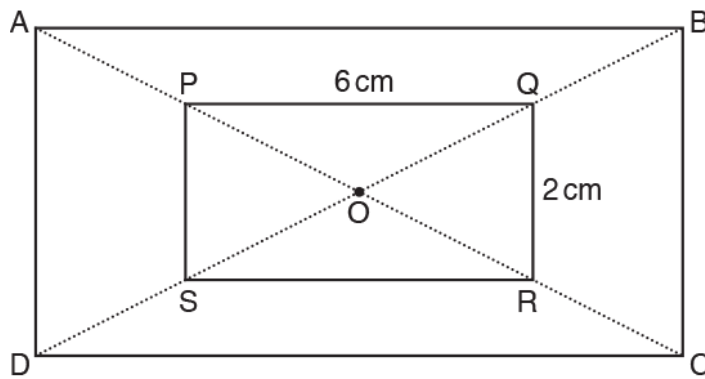
Work out the perimeter of the shape.

----- cm [3]





9. ABCD and PQRS are rectangles.  
O is the centre of both rectangles.



Not to scale

AC is a straight line passing through P, O and R.  
BD is a straight line passing through Q, O and S.

PQ = 6 cm and QR = 2 cm.

The perimeter of rectangle ABCD is 40 cm.

Work out the length and width of rectangle ABCD.

length = ----- cm

width = ----- cm [3]

**END OF QUESTION PAPER**

Question			Answer/Indicative content	Marks	Part marks and guidance	
1			40 (cm)	2	M1 for $4 \times \textit{their} \sqrt{100}$	
			<b>Total</b>	<b>2</b>		
2		i	0 or none or zero	1		<u>Examiner's Comments</u> In (i) '0' was seen quite often and 2 or 4 were common errors.
		ii	4	1		<u>Examiner's Comments</u> (ii) was more successfully answered with some errors of 2, 1 and 90°.
		iii	56	3	B1 for identifying length 4 [cm] and M1 for $(7 + 3 + \textit{their} 4) \times 4$ oe	May be seen on diagram <i>Their 4</i> must be between 3 and 7 <u>Examiner's Comments</u> Part (iii) proved challenging for many students and a range of incorrect methods were used. Many students calculated $4 \times 21$ from the four rectangles making up the shape. Others knew how to calculate the perimeter though relatively few worked out the key missing length. A common misconception was to measure the diagram ignoring the 'not to scale' information. Others avoided multiplication by showing all sides in an addition of $7 + 3 + 4 \dots$ , a significant number missed off a side.
			<b>Total</b>	<b>5</b>		

Question	Answer/Indicative content	Marks	Part marks and guidance
3	<p>Jake is correct as circumference is [distance] around the circle <b>and</b> perimeter [of triangle] is [distance] around the triangle</p>	1	<p>Or Statement referring to the triangle being inside the circle</p> <p><b>Exemplar responses:</b></p> <p>Yes; the triangle fits in the circle (1) /</p> <p>Yes because the circle holds the triangle inside of itself, so there for has a bigger circumference. (1) /</p> <p>Jake is correct because the circle goes around the triangle. (1) /</p> <p>Yes because the circumference is the whole circle and the triangle is in the circle (1) /</p> <p>Yes because the triangle is inside the circumference and the perimeter is smaller than the circle (1) /</p> <p>Yes because the triangle fits inside part of the circle (1) /</p> <p>He's right because the circumference has more cm than the perimeter of the triangle (1) /</p> <p>He is correct, we know this because one of the sides of the triangle goes through the centre of the circle to form a diameter. (1) /</p> <p>Jake is correct because the triangle just touches the circumference of the circle with each point of the triangle. (1) /</p> <p>He is correct as the diameter of the circle is almost 7cm and the longest side of the triangle is the same – the circumference will be larger (1) /</p> <p>Jake is correct because the circumference would be <math>\pi \times D = \pi \times 6.1</math> but the perimeter of the triangle would be less as the longest side is less than 6.1 (1) /</p>

Question	Answer/Indicative content	Marks	Part marks and guidance
			<p>Yes the circumference of the circle (outside) is bigger than all the triangle side added up. Circle 360 triangle 180</p> <p><b>We can ignore the incorrect statement alongside a correct statement (1) /</b>            Jake is correct because if the perimeter of the triangle was bigger than the circumference it wouldn't be able to fit inside the circle (1) /</p> <p><b>Do not accept:</b></p> <p>Yes the circumference is bigger than the perimeter            Yes because the triangle is smaller than half a circle            I agree because angles of a triangle only add up to 180, whereas the circumference of the circle is 360°.            Jake is correct as a circle is 360° where the triangle is only 180°.            Yes he is correct because the circle has a larger area than the triangle            Jake is correct because the circumference is double the length of the diameter and the triangle is showing the diameter.</p> <p><b>Double the length is incorrect. Triple the length would be ok.</b>            Jake is correct because there are more sides on the triangle to add up compared to the circumference.</p> <p><b><u>Examiner's Comments</u></b></p> <p>Most scoring statements made reference to the triangle being inside the circle. Few considered the</p>

Question			Answer/Indicative content	Marks	Part marks and guidance	
						problem in terms of the distances around the outside of the shapes. Common reasons that were not credited referred to $360^\circ$ in a circle and $180^\circ$ in a triangle or stating that the area of the circle is greater than the area of the triangle.
			<b>Total</b>	<b>1</b>		
4			48.69 to 48.71	2	<b>M1</b> for $\pi \times 15.5$ oe  <b>Examiner's Comments</b>  Many candidates knew the formula for the circumference of a circle. Some lost marks however as they did not follow the instructions on the front of the paper and did not use the $\pi$ button on their calculator or the value 3.142. Other errors included finding the area or using the radius instead of the diameter.	
			<b>Total</b>	<b>2</b>		

Question			Answer/Indicative content	Marks	Part marks and guidance	
5		i	20	1		
		ii	Rectangle drawn with perimeter of 20	2	<b>M1</b> ft rectangle drawn with perimeter of their (i)  <b>Examiner's Comments</b>  This question was answered well by only a minority of candidates with many confusing area and perimeter throughout the question. The answer of 24 was a common error and was the offered response almost as often as the correct answer of 20. The candidates with the answer of 24 often then offered a $3 \times 8$ rectangle as their response to part( ii).	Not $6 \times 4$ or $4 \times 6$ Condone freehand
		ii				
			<b>Total</b>	<b>3</b>		

Question		Answer/Indicative content	Marks	Part marks and guidance	
6		* Answer 1160 with commentary	7	eg Vertical strips – $5 \times 150 = 750$ Horizontal strips – $2 \times 80 = 160$ 1030 Radii – $3 \times 40 = 120$ Semi-circle – $\frac{1}{2} \times \pi \times 80 = 125.6$ to 126  Total = 1155.6 to 1156 -----	
		Answer 1160 but no commentary OR 1155.6 to 1156 seen with commentary	6-5	1155.6 to 1156 seen but with no commentary <b>OR</b> Correct method soi for straight total AND semi-circle length with commentary	
		Correct method soi for straight total AND semi-circle length but with no commentary	4-3	Correct method soi for semi-circle length AND horizontal total or vertical total or radii total <b>OR</b> Correct method for straight total AND $\pi \times 80$ [251 to 252] soi	
		Correct method soi for straight total OR semi-circle length	2-1	Correct method soi for horizontal total OR vertical total OR radii total OR $\pi \times 80$ seen soi	

Question			Answer/Indicative content	Marks	Part marks and guidance	
			No relevant work	0	<p><b>Examiner's Comments</b></p> <p>Working was often easy to follow although there was often a lack of worded explanation or commentary which was required to access full marks. A significant number of candidates considered area to be the important measure in this practical question and so gained no marks. Many candidates were able to calculate the total for the horizontal lengths or the vertical lengths, or the radii, or all the straight lengths. The curved semi-circle length was correctly found by only the better candidates; some used area here despite using length for the rest – most used a combination of straight lengths for this section. It was possible to award 7 or 6 marks in some cases where candidates demonstrated complete mastery of the skills required with a clear explanation of their strategy.</p>	
			<b>Total</b>	<b>7</b>		



Question		Answer/Indicative content	Marks	Part marks and guidance		
7		214	5	<p><b>B4</b> for 214.2 or 214.24 to 214.26 OR <b>B1</b> for 60 marked or used as width of rectangle or distance from B to the corner</p> <p>AND</p> <p><b>M2</b> for <math>\frac{1}{4} \times \pi \times 120</math></p> <p>soi by 30<math>\pi</math>, 94.2 or 94.24 to 94.26 or <b>M1</b> for <math>\pi \times 120</math> soi by 376.8 to 377.1</p> <p>or <math>\frac{1}{2} \pi \times 120</math></p> <p>soi by 188.4 to 188.6 AND <b>M1</b> for 2 <math>\times</math> <i>their</i> 60 + <i>their</i> 30n AND <b>B1</b> for their final answer written to more than 3 figs correctly rounded to 3 s.f.</p> <p><u>to a max. of 4 marks</u></p>	<p>Accept 120 + 30 <math>\pi</math> for <b>B4</b></p> <p>Allow e.g. r = 60 for <b>B1</b></p>	
				Examiner's Comments		

Question			Answer/Indicative content	Marks	Part marks and guidance
					<p>It was rare to award full marks in this question. Many candidates began by calculating areas rather than perimeters. Some found a correct solution, but failed to round it to 3 significant figures, which resulted in four marks. Most marks awarded in this question were for use of <math>\pi d</math> divided by 2 for the semicircle's arc length and for clearly identifying 60 as the side length or radius.</p>
			<b>Total</b>	<b>5</b>	

Question		Answer/Indicative content	Marks	Part marks and guidance		
8		68.8	3	<p><b>M2</b> for <math>2 \times (12 + 15 + 7.4)</math></p> <p>OR</p> <p><b>M1</b> for <math>15 - 5.8 - 6.3 + 2.9</math></p> <p><b>M1</b> for <math>12 + 15 + 12 + 6.3 + 7.4 + \textit{their} 2.9 + 7.4 + 5.8</math> oe</p>	<p>Accept any other complete and correct methods</p> <p>May be <math>15 - 12.1</math></p> <p>If not 2.9 then <i>their</i> 2.9 must be seen on diagram in correct place or come from <math>15 - 5.8 - 6.3</math></p>	
				<p><b>Examiner's Comment</b>  Most candidates understood what was meant by perimeter and often showed working. Only a few tried to find area. A common error was to add the given numbers only. Others missed out the width of the small cut-out (2.9 cm) and some did not realise that both sides of the insert were 7.4 cm. In some cases candidates found the width of the insert, but then failed to use it in their total perimeter calculations. Another error was to split the shape into sections and either add individual perimeters or find areas.</p>		

Question		Answer/Indicative content	Marks	Part marks and guidance		
		Total	3			
9		[length =] 15 [width =] 5	3	<p>M1 for perimeter PQRS = 16 or <math>2 \times \textit{their}</math> length + 2 <math>\times \textit{their}</math> width = 40</p> <p>M1 for ratio length AB to BC oe = 3:1 soi <math>\frac{40}{4}</math> or <math>\textit{their} 16\text{S}</math></p> <p>oi</p>	<p>Condone length = 5 width = 15 If answer line is blank accept 15 and 5 correctly placed on the diagram</p>	
		Total	3			

Examiner's Comments

Not many gave the correct answers, and 15 and 5 were often in reversed places when seen. A good number of candidates worked out 16 as the perimeter of the inner rectangle, but then didn't appreciate that the rectangles were similar. Others worked from the knowledge that the outer rectangle had a perimeter of 40 and therefore they chose 2 sides which added to 20. Some realised that the outer rectangle was an enlargement of the inner one and gave answers in a ratio of 1 : 3. In these cases the scale factor used was usually 2.